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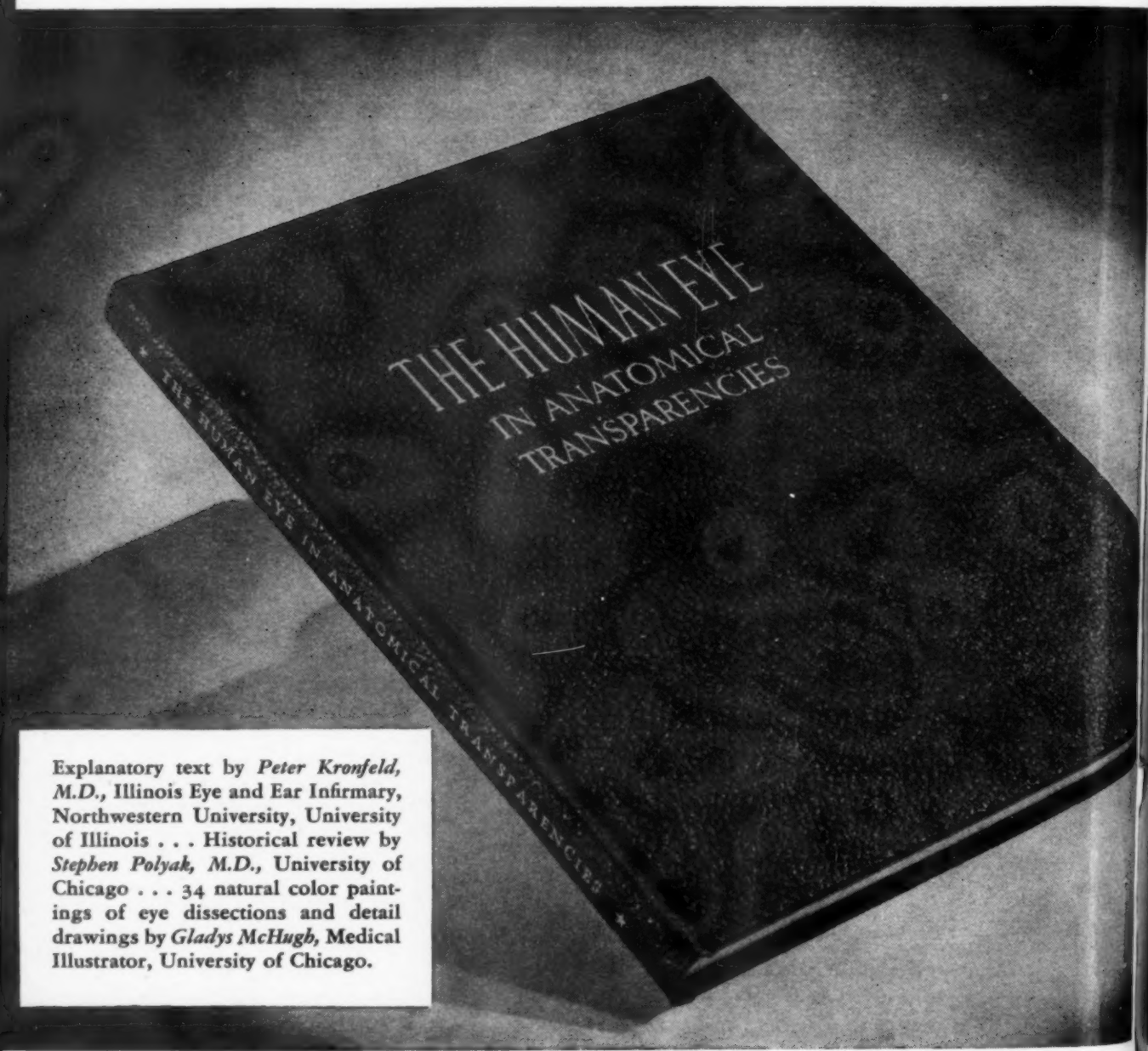

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DIAGNOSTIC AND THERAPEUTIC USE OF MONOCULAR OCCLUSION*

Robert E. Bannon, Dartmouth Eye Institute,
Hanover, N. H.

Duke-Elder[1] has pointed out that binocular vision is characteristic only of the primates and that the phylogenetic advance of man has been primarily the result of this acquisition. Binocular vision gave to man a delicate coordination of his eyes and hands, forming the basis for his physical dexterity and intellectual supremacy. Duke-Elder contends that binocular vision is a perceptual process of considerable complexity. He divided it into two stages. First, a sensory image is elaborated by each uniocular mechanism at the same time, and secondly, *if the two images are suitable,* they are fused into one by a perceptual process on a higher level. He argues further that the two simultaneous and similar uniocular sensations or *ocular images* are possible with binocular vision as possessed by man because the visual fields of the two eyes overlap, allowing the same object to be seen by each eye. Furthermore, the central nervous system of man is organized so that the ocular images of the two eyes can be fused.

In cases of strabismus where there is no binocular cooperation it is not likely that a patient's symptoms of asthenopia or headaches are due to *faulty* binocular vision since this function is not established. Despite the objective evidence of a visual anomaly, that is, a strabismus, it would be unwise to assure a patient complaining of asthenopia or headaches that his symptoms would be relieved by the correction of the strabismus. To be sure, the correction of the strabismus would insure a better cosmetic effect and possibly a more efficient use of the two eyes but one cannot expect relief from physiological symptoms by treating an anomaly which obviously could not be responsible for the symptoms.

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*Abridgment of paper read before the New England Council of Optometrists Congress, Hotel Statler, Boston, Massachusetts, March 21, 1943, and the New York Academy of Optometry, Hotel McAlpin, New York City, March 23, 1943. Submitted on August 24, 1943 for publication in the October, 1943, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.

The patients who have binocular vision but continue to complain of discomfort when using their eyes after careful correction of the refractive errors, are the ones necessitating the consideration that their symptoms may be due to some binocular factor not revealed by our usual tests. Patients that have been examined by several competent men and have been given various glasses, orthoptics, and other therapy without significant relief from symptoms should be considered "problem cases" and should be analyzed carefully. If a person really has severe symptoms upon using his eyes and has not been able to attain relief by the usual procedures he will welcome the rational analysis of his problem by simplifying his visual apparatus to the extent of using only one eye instead of two. Removing the possibility of binocular vision by monocular occlusion does away with many possible causative factors of discomfort (heterophorias, accommodation-convergence imbalances, aniseikonia) and thereby relieves the neuro-muscular apparatus of many fine and exacting adjustments. If a patient reports marked relief after using only one eye long enough for him to become adapted to monocular vision, the inference is clear that the symptoms were due to some *binocular* difficulty and the problem is then resolved into finding *what* binocular factor is causing the difficulty or, as is occasionally the only solution, the advisability of continuing the use of one eye rather than two.

In this country, Marlow[2] has apparently contributed most of the literature on monocular occlusion. He stated that he began using monocular occlusion for diagnostic purposes as early as 1894[2e] although his first papers on the subject do not appear in the literature until some years later. In general, it can be stated that Marlow used monocular occlusion primarily to uncover latent heterophoria. He recommended that the non-dominant eye be covered, using either a ground glass spectacle lens or black court-plaster. Marlow insisted that the test would have infinitely greater value if the eyes were dissociated for from three days[2a] to two weeks[2e]. In 1924, Marlow published a monograph [2b] which included statistics on 700 cases. It is upon the results of these cases that Marlow based the value of his test.

Many other eminent eye specialists[4] (Lancaster, deSchweinitz, Holloway, O'Connor, Barkan, Brown) have used the occlusion test, and have written favorably about it because of good results obtained. When Ernst Fuchs[3] visited this country he was favorably impressed with the

"occlusion test," having observed its use by a number of American eye specialists.

Monocular occlusion has not been accepted by everyone. Duane[5], for example, questioned the value of the test, because in his opinion it did not reveal a true hyperphoria, but caused an artificial dissociation of the visual planes. Abraham[6] questioned the value of the test on the ground that it demonstrated Bell's Phenomenon, a normal phenomenon wherein the covered eye turns upward and outward as in sleep or the early stages of anesthesia, and could not be a method for uncovering latent heterophoria. Beisbarth[7] regarded the test as an impractical one, basing his objections on a series of 29 cases. He felt that the good results claimed by some authors could be accounted for by their hesitancy to prescribe a full correction for the amount of heterophoria found after occlusion.

Marlow[2f] replied to the criticisms of Abraham and Beisbarth by discounting their adverse results on the grounds of inadequate procedure: Too short a period of occlusion (one to twenty-four hours only), too few cases, and incomplete observation. Marlow pointed out that prescribing for heterophoria is not always a simple matter, the amount of the error alone not being the deciding factor but the decision must be controlled, or modified, by a comparison of the fusional amplitudes, the distribution of the phoria in the different directions of gaze, and the difference brought out by occlusion of the alternate eye.

Chavasse[8], in his book on "Squint," recommended occlusion as one of the steps in the diagnosis of the deviation. He stated that the primary object of the test was diagnostic and mentioned that a more accurate retinoscopy and subjective refraction was made possible. Chavasse also believed that occlusion served to develop the acuity, fixation, and rotations of the squinting eye.

It is apparent from this brief review of the English and American literature on monocular occlusion that such means have been tried with fairly convincing results in suspected cases of motility imbalances. It is also clear that since monocular occlusion dissociates the two eyes the accommodation-convergence relationship is suspended. A third factor which most practitioners have not considered, but which has been mentioned[9], is aniseikonia. Since aniseikonia (the relative difference in size and/or shape of the ocular images) is a *binocular* anomaly it is only logical to assume that people affected by this condition should be relieved

of their symptoms when binocular vision is interrupted. When a patient reports either partial or complete relief from his symptoms during monocular occlusion and such factors as latent heterophoria or an abnormal accommodation-convergence relationship is not made manifest following the occlusion of one eye, it is safe to conclude that aniseikonia may be responsible for the patient's symptoms.

During the past two years we have accumulated some data on patients who have experimented with monocular occlusion. Many of these patients resorted to using one eye on their own initiative for therapeutic purposes, that is, because they discovered that using monocular vision relieved them of distressing symptoms arising from the use of the two eyes together. Other patients were advised by their own doctors to try monocular occlusion for diagnostic purposes. Patients have been referred to us by their doctors for aniseikonic examination because they had symptoms not relieved by careful refractive corrections and orthoptics, whose symptoms, however, were relieved when one eye was occluded. In some cases, we have advised patients to occlude one eye because they did not get relief by our first correction and we, as well as the patient, wanted to be certain that the symptoms were due to ocular factors before incurring any further expense for examination and glasses.

Sufficient data have been obtained on a group of 80 patients to make it worth while to discuss them. Fifty-six (or 70%) of the 80 patients when monocularly occluded reported marked relief from their chief symptoms. Nineteen patients reported no relief and five were indefinite. (TABLE No. 1.) Out of a total number of 80 patients, 49 were found to have a significant aniseikonia while nine manifested a significant heterophoria following occlusion. Twenty patients had both an aniseikonic and a motor anomaly. Two cases had no binocular anomalies. (TABLE No. 2.) The explanation for such a high number of aniseikonic cases and a relatively low number of motility cases in the group under discussion is that the patients studied were referred to us primarily because aniseikonia was suspected and the motility factor had been pretty well ruled out by the referring doctor.

TABLE No. 1

Total Number of Cases	80	(100%)
Symptoms Relieved While Occluded	56	(70%)
Symptoms Not Relieved While Occluded	19	(24%)
Indefinite (No Report)	5	(6%)

TABLE No. 2

Total Number of Cases	80	(100%)
Aniseikonia (only) Found	49	(61%)
Motility Anomaly & Aniseikonia Found	20	(25%)
Motility Anomaly (only) Found	9	(11%)
No Binocular Anomaly Found	2	(3%)

It should be realized that the group under discussion is a very special group of long-suffering patients that had consulted numerous specialists and had tried numerous therapies. It is not necessary to employ monocular occlusion for the majority of patients because most patients' problems can be diagnosed and treated quite easily in one or two thorough examinations. The remaining number represents a small group but, nevertheless, a very deserving and oftentimes troublesome group because its symptoms are so severe and so persistent. It is, therefore, quite an achievement to be able to diagnose and help a few patients in this group. TABLE No. 3 gives the results on this small group of patients whose symptoms were so severe and of such long standing as to warrant monocular occlusion despite the highest professional attention.

TABLE No. 3

Total Number of Cases	80	(100%)
Relief When Binocular Anomaly Corrected	44	(55%)
No Relief When Binocular Anomaly Corrected	18	(22%)
Monocular Occlusion Continued	11	(14%)
Indefinite (No Report)	7	(9%)

Forty-four, or slightly more than half of the total number (80) of cases studied, obtained relief when their binocular anomalies were corrected. Eighteen patients, according to their reports, received no relief when their binocular anomalies were corrected. We have not heard from seven of our cases. Eleven patients were advised to continue with monocular occlusion because we knew of no other way to correct their binocular anomalies, and, furthermore, they were more comfortable when using one eye. These eleven patients include two cases of macular lesions, one case of macular microspia following retinal detachment surgery, seven cases of unstable heterophorias that did not respond favorably to orthoptics or surgery, and one case of persistent diplopia ("horror fusionis").

The doctor's first opportunity to obtain information about the effect of monocular occlusion on a patient is during the taking of the

"history and symptoms." Many patients, upon being questioned, report that they have found they can read, watch a movie or a baseball game much more comfortably with one eye closed or covered. This information furnishes a good clue that there is some obstacle, either a motility factor or aniseikonia, interfering with the comfortable use of the two eyes in binocular vision.

When a patient's symptoms persist after careful refractive corrections and other therapies, it may be suspected that some binocular anomaly is present. Monocular occlusion and the reasons for it are discussed with the patient because it is important to have his cooperation and understanding of the purpose of the test. The patient should be informed that the covering of one eye is for diagnostic purposes, that is, to help decide just what is the cause of his symptoms. The patient should be assured that the uncovered eye will not be "strained by doing all the work" and the covered eye will not lose its vision. It is also wise to warn the patient about the inability to judge distances accurately with one eye; care should be exercised in going through doorways, up and down stairs, pouring liquids, placing plates on tables, etc. It is best to advise against driving cars or working around dangerous machinery when monocularly occluded.

Everyone who plans to advise his patients to use monocular occlusion should try it first himself so that he will not only become familiar with the change in phoria before and after occlusion but also so that he will be better able to advise his patients about the peculiarities of monocular vision. It would also be helpful to try monocular occlusion on a few "normals," that is, people without symptoms, so that a knowledge of a normal change in the phoria measurement following monocular occlusion will be available. In general, a person with good binocular vision and no symptoms will be greatly annoyed the first few days he is forced to use only one eye. This fact serves as a sort of measure of the severity of the symptoms that some patients report are relieved with monocular occlusion. When a patient states that monocular vision is a bit annoying but nowhere near as bothersome as his former headaches it can be realized how much of a nuisance his headaches must have been.

There are many types of occluders. Marlow used a ground glass lens or black courtplaster. If a patient does not wear glasses a cloth patch (Fig. 1) may be employed but this device has a disadvantage of keep-

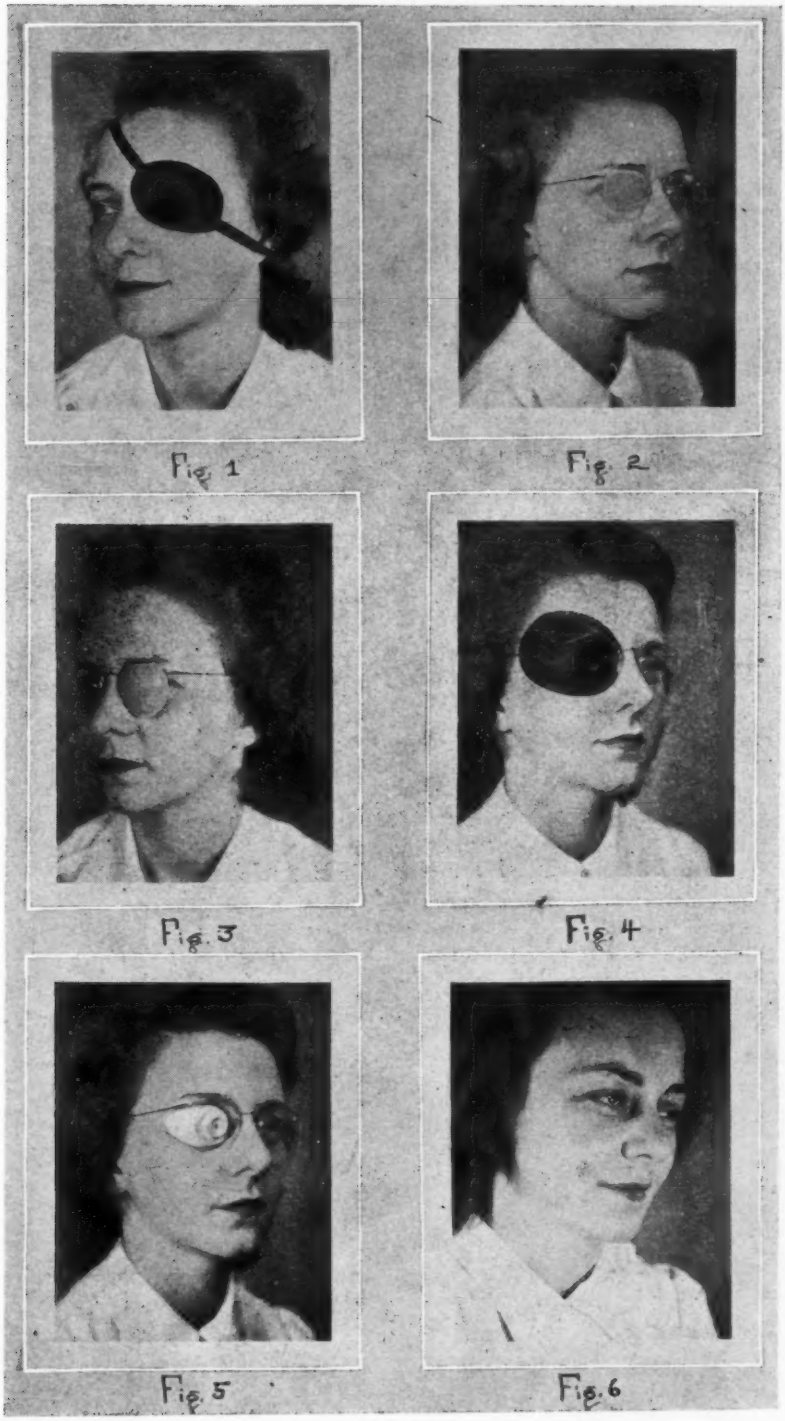

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

ing the lid closed and interfering with the normal tendency of blinking. There are many types of ground glass, frosted glass, opaque semi-polished lenses (Fig. 2) which afford partial occlusion. A flesh-colored bakelite shield (Fig. 3) is very handy and is easily fastened to spectacles. It does not give complete occlusion because it allows light to enter from the side. A rubber shield (Fig. 4) provides complete occlusion, allows the covered eye to remain open, and permits freedom for blinking. It is, however, rather warm and conspicuous. The best type of occluder* we have found is a flesh-colored bakelite one (Fig. 5) with side shield and a suction cup which permits it to adhere to the inside of the spectacle lens. It is relatively inconspicuous, light, permits the eyes to remain open, does not interfere with blinking, and provides complete occlusion. The most inconspicuous occluder is an opaque contact lens (Fig. 6) and we have used this means to provide permanent occlusion in a few cases.

It has been found of little or no value to advise monocular occlusion for only a few hours a day; or even constantly for a day or two. In order for the test to be conclusive, it is usually necessary to advise constant occlusion of one eye for at least two weeks. The severity of the symptoms and the patient's sensitivity must be taken into account but, in general, most patients are more annoyed than helped by only a few days' occlusion. After one week, however, most patients become adjusted to monocular vision and, if their symptoms are due to some binocular anomaly, they may begin to experience relief during the second week of occlusion. It is possible, even if the patient does not report relief while occluded, that he may get relief by the correction of a heterophoria or an aniseikonia measured following occlusion.

It is very important to examine the patient for a latent phoria immediately upon removing the occluder. One must become familiar with the "normal" change in the phoria measurement following occlusion because it is to be expected that the covered eye tends to turn upward and outward. The measurement of, and the prescription for the vertical phoria found after occlusion presents the most serious consideration. The alternating, or dissociated hyperphoria† which Bielschow-

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*Manufactured by the Watchemoket Optical Company, East Providence, Rhode Island.

†Better called "dissociated vertical divergence" by Bielschowsky and agreed upon by Lancaster in his paper Terminology in Ocular Motility and Allied Subjects, Am. J. Ophth. Vol. 26, No. 2, Feb., 1943.

sky[10] has written about so often is usually uncovered by the prolonged occlusion test. This type of deviation, in which the covered eye turns upward, is purely an innervational anomaly and is not amenable to correction by vertical prisms or surgery. If a left hyperphoria is measured following the occlusion of the left eye, no conclusion should yet be formed, but the right eye should be occluded for the same length of time as the left eye. After removing the occluder from the right eye, if a right hyperphoria is manifest, one should realize he has found not a true hyperphoria, but a case of *dissociated vertical divergence.* A further clue to this type of innervational anomaly is that the vertical fusional amplitudes are usually higher than normal, but equal.

The lateral phorias revealed following occlusion are to be dealt with in the usual manner bearing in mind that it is usual to find more exphoria (or less esophoria) following occlusion. The fusional amplitudes, for distance and near, and the change in phoria with different directions of gaze are the basis for deciding on a correction rather than the measurement of the phoria only because, as is well known, the tonicity of the extrinsic ocular muscles is such that a part of the total deviation can be compensated for without undue effort.

Aside from the important information that monocular occlusion gives relative to the more nearly static "position of rest" of the eyes, it is possible to deduce whether *aniseikonia* plays a part in the patient's symptoms, provided the evidence as to the muscle imbalance after prolonged occlusion is not significant, and the patient has found relief from his original symptoms while using monocular vision.

The *positive information* of relief from symptoms while monocularly occluded is the real value of the occlusion test. On the other hand, absence of relief from symptoms while using monocular vision should be considered only as *negative information* and it should not be inferred that this is conclusive evidence that no binocular anomaly is present since it must be realized that, to some patients, the loss of binocular vision may be a greater annoyance than the original symptoms. One should keep in mind that the occlusion test insofar as the patient is concerned, makes it necessary for him to choose between the annoyance of the loss of binocular vision and his original chief complaint, let us say, of headaches. It is important to list the original chief complaint, or symptoms, (prior to occlusion) and compare them with the patient's remarks after being occluded for two weeks. One can be led astray easily by misinterpreting

the patient's report following occlusion. One of our patients whose original chief complaint was of persistent headaches reported after two weeks' monocular occlusion, as follows: "I did not like having one eye covered; it bothered me very much." On first thought, we might have concluded that the patient was *not* more comfortable with monocular vision and that, therefore, binocular anomalies were ruled out, but on questioning the patient further, asking about the original symptom of daily headaches and what was meant by the statement of the occluder "bothering very much," the patient stated that, "Oh, I did not have *any headaches* after the first three or four days, but all my friends thought I looked queer with one eye covered, and I was annoyed in crossing streets because I had to turn my head around so much." When asked how he compared the annoyance of monocular vision with his former daily headaches, the patient replied "I'd take the occluder any time in place of the headaches."

Some very sensitive patients have reported "mental confusion" and considerable annoyance in walking about with complete occlusion of one eye so that it was necessary to begin with only partial occlusion in order to get them gradually accustomed to monocular vision.

In general, a patient whose symptoms are severe and who has consulted several doctors in search of comfort will be glad to follow the advice of occluding one eye for two weeks. Most of these "problem cases" can be treated much easier after occlusion than before, especially if they have gained a ray of hope by even partial relief from their symptoms while occluded. They are encouraged when it is proven that their symptoms have some ocular basis and they will more readily follow further advice and treatment in an effort to bring about the same relief they experienced while using monocular vision. As our data show, most of our patients were given final relief by the correction of their motility imbalance or their aniseikonia. There are a few cases which cannot be given comfortable *binocular* vision, but at least they can be given comfortable *monocular* vision. One of our patients who had a small lesion near the fovea of one eye obtained complete relief from headaches by monocular occlusion and was made happy by an opaque contact lens* with an iris painted on to match that of the other eye. Another patient

*These were patients of Dr. Walter B. Lancaster when he was Chief of Staff of the Dartmouth Eye Institute and it was he who originated this treatment. Dr. Lancaster has employed monocular occlusion for therapeutic purposes for forty years and still uses it.

with a constantly fluctuating heterophoria was also relieved of symptoms with an opaque, painted iris contact lens* for one eye. A third patient who had had a "successful" retinal detachment operation on one eye could not obtain binocular vision in a small central field, because of a macular micropsia, although the peripheral fields were fused. He willingly resorted to permanent monocular occlusion to avoid confusion caused by the overlapping of small objects centrally fixated. Eight more patients have resorted to more or less constant monocular occlusion as the only means of maintaining comfort. Numerically more important, however, is the group of forty-four patients who have been given relief by a correction of their binocular anomalies. If we add the eleven cases continuing with monocular occlusion to the forty-four cases made comfortable with binocular corrections we have a total of 55, (or 69%), out of the total group of 80 patients, that have been enabled to continue their work with comfort.

It is interesting to note (TABLE No. 4) that the majority (47 out of 56) of patients who reported relief when occluded also obtained relief when their binocular anomalies were corrected. This is a pretty strong argument for the *positive* value of monocular occlusion, that is, if a patient reports relief when using one eye only there is a good chance (at least 8 out of 10) that the patient will get relief with the correction of the binocular anomaly (heterophoria, aniseikonia, or both). It is possible, however, that a patient may get relief from the correction of his binocular errors even if he experienced no relief while occluded. We have five cases out of 19 who obtained relief when corrected for their binocular errors but not while occluded. From this we would have to estimate that the chances are 5 out of 19, or about 1 out of 4, of a person obtaining relief from a binocular correction following a *negative* response to the prolonged occlusion test. This chance (1 out of 4) should not, however, be denied the patient if all other factors that might account for his symptoms have been ruled out and there is some evidence from the history, or from other ocular findings, that the symptoms are somehow associated with the use of the eyes.

TABLE No. 4

Total Number of Cases.....	80	(100%)
Relief While Occluded (56 cases) and with Rx Given.....	47	(59%)
No Relief While Occluded (19 cases),		

Nor with Rx Given	13	(16%)
Indefinite While Occluded or with Rx Given	11	(14%)
No Relief While Occluded (19 cases), but Relief with Rx Given	5	(6%)
Relief While Occluded But No Relief With Rx Given	4	(5%)

Summary and Conclusion:

The usefulness of monocular occlusion for diagnostic purposes is reviewed with the intention of showing that for many years this method has been used with some success to disclose latent heterophoria. It is now brought out that monocular occlusion may serve to disclose another binocular anomaly, namely, aniseikonia. This relative difference in the size of the ocular images being a *binocular* anomaly and therefore a handicap to the fusion faculty is not unlike heterphoria in its effects on the comfortable and efficient use of the two eyes.

To support the logical assumption that aniseikonia is a barrier to comfortable binocular vision we have presented data of 80 cases which show that in 61% of the cases the relative difference in the size of the occular images (aniseikonia) was a significant factor.

In conclusion, it should be borne in mind that while monocular occlusion is a great annoyance to one with *comfortable* binocular vision it is a valuable clue, as well as a means of relief, in many problem cases. The diagnostic value of monocular occlusion allows one to predict the chances of gaining relief by correction of some binocular difficulty, whereas the therapeutic use of monocular occlusion permits one to gain relief by avoiding an uncorrectable binocular difficulty. One may object to the use of monocular occlusion because it is so time-consuming but if a patient's history reveals, for instance, that he has had headaches or asthenopia for many years; has had numerous ocular, physical, and neurological examinations; has had various X-rays; has been in a hospital under observation; and, in general, has spent much time and money to find the cause of his trouble, it will be realized that a two-weeks' test of occluding one eye is no particular handicap. We have seen many patients who have remarked that their doctors did not seem to take their case seriously, despite the fact that they were limited in their work because of discomfort arising from the use of their eyes. These patients welcome the prolonged occlusion test when they realize it affords a means of diagnosis.

Not every practitioner has the ability or the instrumentation to detect and prescribe for a suspected case of brain tumor but all physicians should know of simple clues and "screening tests" which would enable them to make a tentative diagnosis and refer a suspected case to a hospital where X-rays and neurological studies could be made. Likewise, in visual analysis work, every practitioner cannot be expected to have the knowledge, time, and equipment to make all possible tests but all eye specialists should know that binocular anomalies are a very common cause of symptoms and the information gained by the simple occlusion of one eye is a clue pointing to binocular difficulty. Many eye specialists may not be prepared to deal with a case of aniseikonia but, like the physicians with their suspected brain tumor cases, the eye specialists, after completing the "screening test" of monocular occlusion and obtaining a positive result, have adequate reason to advise their patients about the possibility of relief from their symptoms by the correction of their latent phoria or their suspected aniseikonia.

The frontiers of science have advanced considerably since the time (1894) Dr. Marlow first began to use monocular occlusion as a means of detecting binocular dysfunctioning. From these earlier studies one can learn much of value and it is encouraging to be able to continue the advance of our knowledge, in the effort to relieve human discomfort, not only by utilizing the fundamental principles established by our predecessors, but by adding to their accomplishments another important binocular factor in the production of symptoms, namely, aniseikonia.

The writer is grateful to Dr. Walter B. Lancaster for his encouragement and inspiration in writing this paper.

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AN INTERPRETATION OF THE BROCK METHOD FOR THE CORRECTION OF SQUINT*

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In traveling I learned that there were others, besides myself, who were laboring over the mysteries of anomalous projection and retinal correspondence. It was my good fortune to have spent considerable time with Dr. Frederick W. Brock, the author of a series of articles on the subject of Strabismus. Following my visits with Brock, I consulted Dr. Milton N. Chodroff of Brooklyn, who is also a disciple of the Brock Method. My associations with these two Optometric scientists led to a lasting friendship and a better understanding of the problems of Strabismus. Under the guidance of Brock, the Columbia University Squint Research Clinic was organized and well conducted. Chodroff, myself and a few others served as assistants at this clinic.

My purpose, in writing this article, is to interpret or perhaps translate the articles written by Dr. Brock on Anomalous Projection, as far back as February, 1939 (American Journal of Optometry, Vol. 16, etc.). Those phrases which were clear and simple to me are repeated verbatim in this article. In many instances where references are indicated, minor changes in terminology were made to simplify the reading matter. All diagrams are exact copies of Dr. Brock's as they appeared in the Journals.

My definition of Anomalous Projection is that condition peculiar to cases of alternating and some monocular squints, wherein, images of a single object fall on non-corresponding retinal points of the two eyes. The eyes in turn project these images along the direction of the accustomed angle of squint. According to Brock, in anomalous projection, there is no anatomical correspondence. Visual direction is based entirely on an acquired muscle sense, which in turn corresponds to the existing angle of squint. The two images are transmitted as impulses along disparate nerve fibers to the highest visual cortical centers where their spatial relationships are somehow evaluated.

Helmholtz claimed that a definite anomalous correspondence ex-

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isted in these cases as a development from a learned reflex action. Herring contended that retinal correspondence is innate and therefore cannot be changed at will. On this premise, Verhoeff[1] denied the possibility of anomalous retinal correspondence. If Helmholtz is correct, then our present methods of orthoptic training are correct. If, however, Herring's dictum is correct, then we must find a new method for the correction of anomalous projection.

In order to determine which theory is correct, Brock[2] set up a series of experiments starting with his Anomoscope (Fig. A). The Anomoscope consists fundamentally of a broad band of black cardboard fastened horizontally on a sliding device to permit its approach or withdrawal at right angles from the patient's head which in turn is securely fastened to a chin and head rest. Two sliding targets of antagonistic colors, namely, red and green, are placed on this band in such a way that they can be moved horizontally in either direction from a position immediately above each other to any given lateral separation. Black markings on each target provide a means of establishing the position of best visual acuity which, by necessity, must fall on the primary visual axes of the two eyes respectively. By providing the subject with a red filter over one eye and a green one over the other and by selecting the proper illumination, only

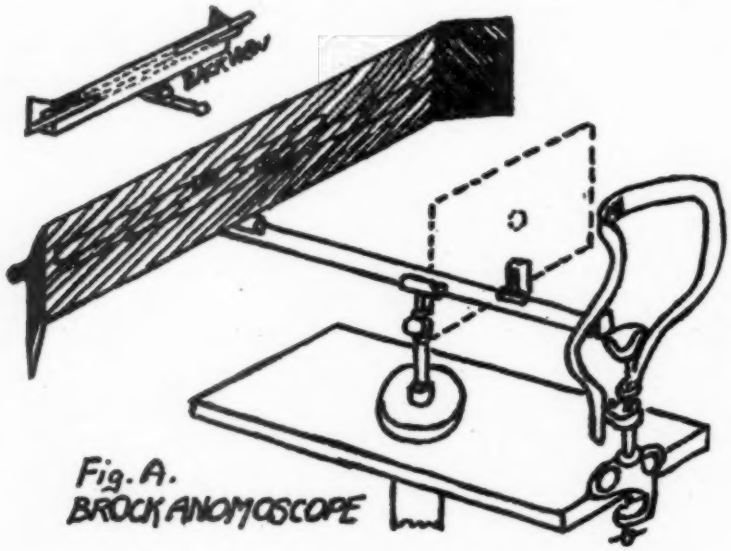
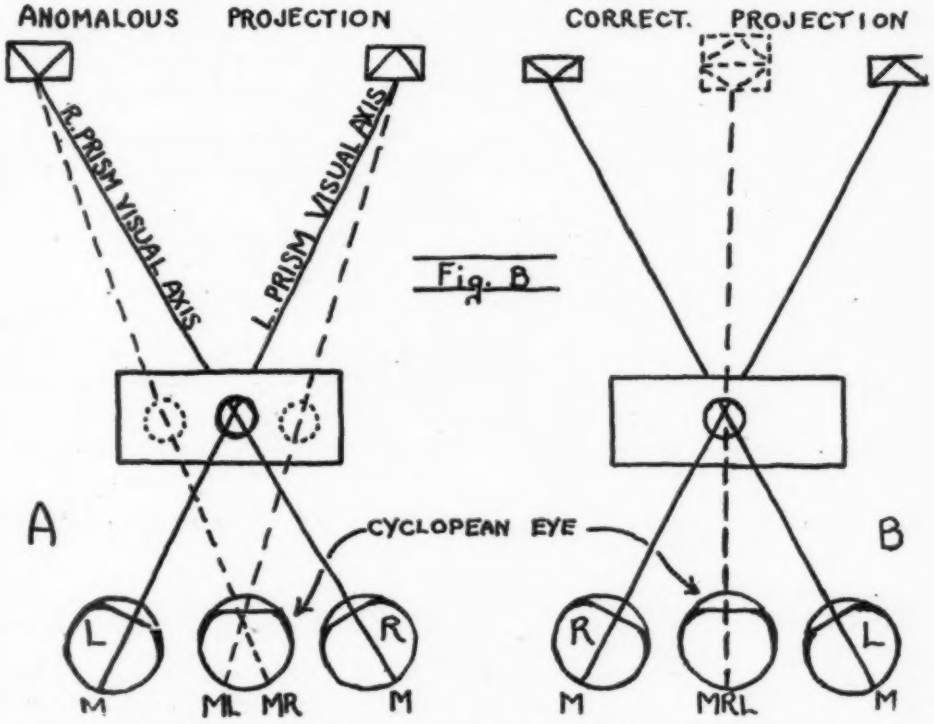


Fig. A.
BROCK ANOMOSCOPE

[1] Brock, F. W. Investigation Into Anomalous Correct Projection. Am. Jour. Optom. 16. 2. 1939.
[2] Brock, F. W. Anomalous Projection in Squint. Am. Jour. Optom. 16. 6. 1939.

one target remains visible to each eye. A slide holder is provided for a secondary chart with a central round opening to be placed at the exact crossing point of the primary visual axii of the two eyes. This slide holder is removable at will.

By keeping the illumination at an absolute minimum and properly illuminating the two sliding targets, Brock kept the patient unaware of his surroundings except for the two square targets, one red and one green, which are both simultaneously illuminated and seen. The red target is seen by the eye looking through the red filter and the green by that eye seeing through the green filter. The experiment consists of aligning the two targets respectively with the two primary visual axii of patients with established anomalous projection, good macular perception in both eyes, and with monocular or alternating convergent squints. After this



is accomplished, a white piece of cardboard with a central round opening a half an inch in diameter is placed at the exact crossing point of the visual axes (Fig. B). This results in bringing each distant target when viewed monocularly, into the center of the circular opening. When both distant targets are made simultaneously visible the resultant bi-

retinal visual sensation is almost of pathognomic similarity in all cases of anomalous projection. All subjects with anomalous projection which are subjected to this experiment experienced the sensation of looking at two widely separated targets through two identical openings in the white cardboard which constituted the near target. In subjects with normal correspondence, identical or closely identical visual sensations can be elicited either by the use of prisms or by having the subject focus at the circular near target. The result is that both distant targets appear one above the other in the central round opening of the near target (Fig. B).

If, as seems actually the case, the visual receptor organs in both groups receive and transmit similar visual sensations along identical nerve paths to the highest cortical centers, it seems evident to Brook that unification in the two groups must take place along entirely different lines. These two types of unification are depicted in Fig. 2, represented there by the cyclopian eyes for both subjects with and without correct projection.

Whereas, in normal binocular vision, unification takes place along a single "fusion axis" extending from the median line of the head to the crossing point of the visual axes, Brock claims that in anomalous projection unification takes place along two principal axes (Fig. B). It is therefor evident that in normal binocular vision the near object lying at the crossing point is seen in its proper spatial position while the two far objects are mentally displaced from their actual laterally separated position to a superimposed position while on the fusion axii. Conversely, in anomalous projection the far objects retain their actual separation while the near object is seen double. The patient has the sensation of two identical near objects lying along the two principal axii of the cyclopian eye. If the cyclopian eye is lying in the median plane, midway between the two physical eyes, it becomes evident that projection lies along two imaginary straight lines extending from the apparent position of the fixated objects to the median line of the head (dotted line, Fig. B). Whereas the cyclopean eye is monomacular in normal projection it becomes bi-macular in anomalous projection. It should be emphasized that this dual macular relationship is by no means definite and that their separation is variable according to the need and situation.

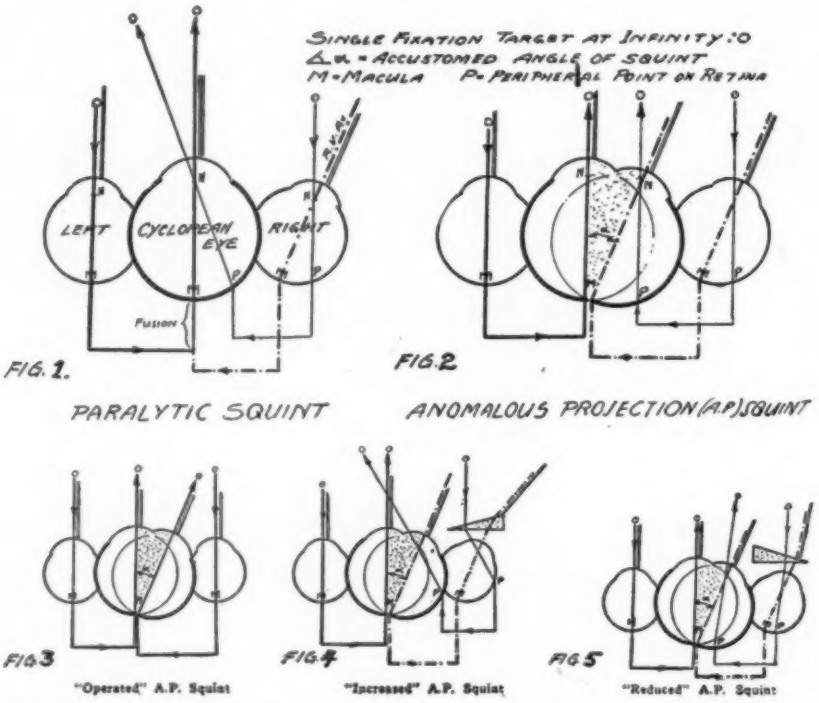
From the foregoing consideration, it becomes evident to Brock

that the difference in these two modes of vision lies in the different mental interpretation of almost similar visual sensations transmitted from identical retinal end termini and along identical efferent visual nerve tracts to the visual cortex. It is important to remember this is the treatment of cases with anomalous projection. These subjects have a decidedly different mental concept of vision and fusion from that which has been generally recognized. It becomes, therefore, of paramount importance that the treatment of anomalous projection with satisfactory visual acuity in both eyes should begin with an attempt to alter the anomalous concept of fusion. This can be done, as will be later described, and can be considered accomplished when the patient has been taught to see a single object as one, when placed at the crossing point of his visual axii. It also becomes evident that no other satisfactory treatment can be selected (which may give us a clue why exotropias have been such a problem) even though it may be along the visual axii of both eyes. Furthermore, if anomalous projectors can be taught normal correct projection then Herring's dictum that retinal correspondence is innate should be correct. Verhoeff also pointed out in his experiments with alternate squinters that the angle alpha will vary, thereby denying the existence of anomalous retinal correspondence. The foregoing conclusions and practical results justify Herring's and Verhoeff's contentions.

I find it advantageous at this time for the sake of clarity to refer to Brock's lecture presented at the Convention of the American Optometric Association in Atlantic City and as reprinted in the OPTOMETRIC WEEKLY. In the majority of concomitant squinters with fair vision in both eyes, there is very rarely any sensation of diplopia as long as the squint is not tampered with. These patients seem to appreciate monocular perception only. No matter whether the visual impression comes from the non-dominant eye or from the dominant eye the final or resultant visual impression will be that of the one of the two images most clearly seen. Only the macular perceived image of the straight eye may serve as the fixating object. Whatever object falls on the macula of the squinting eye, while another object is being fixated, retains a "peripheral position" in the squinter's conscious perception, just as if it were seen by some peripheral area of the non-squinting or fixating eye which has good peripheral perception. It can, therefor, be understood why some alter-

naters have heightened peripheral fields, which they notice the loss of, long after they have been corrected.

In order to get a better understanding of how an anomalous projector sees, Brock compares this mode of vision with a recent paralytic squinter with normal projection (Figs. 1-5). The two physical eyes are shown lying on either side of the cyclopian eye (mental or Fused eye).



The cyclopian eye demonstrates the visual concept resulting from the combined visual impressions of the two eyes. In all these figures there is shown a left fixating eye and a right diverging or squinting eye.

In normal binocular vision the visual axii of the two eyes are mentally appreciated as a single or unified visual axis, an axis which runs from the point of fixation to a point midway between the two eyes. To convince oneself of this phenomenon merely attach two strings of different colors to a point on a wall, each string to terminate at one of the two eyes in V formation. The resultant sensation will be one string of mixed color running from the point of fixation on the wall to the nose. This mixed colored string represents the unified visual axis of the two

eyes. In any case of squint with normal projection where the strings are stretched along the respective visual lines of direction the same unified mixed colored string will be perceived. On the other hand, in cases of anomalous projection these two strings will appear as two strings each running along visual lines of direction, or acccustomed angle of squint of the two eyes.

In Figure 1 this unified binocular visual axis, of a paralytic squinter who had recently enjoyed normal binocular vision, is shown in the cyclopian eye as running from an area representing the binocular visual impressions at M through an imaginary nodal point into space[3]. The directions of the two strings stretched along the visual axii of the two eyes are represented by thin double lines, which for sake of clearness are moved to the right of the visual axii. The visually combined strings are represented by the triple line to the right of the combined visual axii.

Rays coming from fixation targets at infinity reach both eyes as parallel rays. While these rays are focused by the fixating left eye on the macula M the right squinting eye receives the retinal image of this object a considerable distance temporal to the macula in the peripheral area marked P. In the cyclopian eye this point P retains its peripheral position with the result that O is seen double along the axes MN and PN.

Comparing this with the alternate squinter as depicted in Fig. 2, we find the following situation. Bearing in mind the experiment with two colored strings, we know that in this case the patient will see two separate strings, one each, running along the direction of the two visual axii. The fixation axis (Fig. 2) is shown as the solid line while the visual axis and projection axis (both the same) of the squinting eye is the dotted line. The subtended angle formed by the images of the two strings is the angle alpha, which closely equals the angle of squint. The alternater, therefor, projects in the direction of the accustomed angle of squint as if the eyes were totally independent of each other.

It must be assumed[4] that the cyclopian eye of the anomalous projector, is in effect, a composite of both eyes, but only partially superimposed as shown in the diagram. It is just as if the squinting eye were bodily moved over the fixating eye, still retaining its squinting position but joined by its posterior pole to that of the other eye. Remembering again the string experiment for anomalous projectors, we have learned,

[3] Optometric Weekly, August, 1941.
[4] Optometric Weekly, August, 1942.

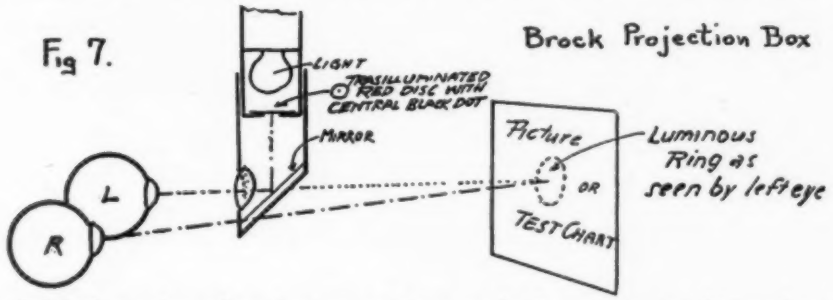
that the projection axis is in the same direction as the object-image axis, regardless whether the object is in the same line of direction as the visual axis of the squinting eye. We might compare the retina of the squinting eye to a backboard causing all rays that fall upon it to bounce back in the same direction they came from. This being the case, in Fig. 2 object O being at infinity reaches P in the squinting eye and M in the fixating eye as parallel rays, both being projected back according to anomalous projection rules to the same object and therefor seen single in the mental concept. The object is seen singly and clearly as that seen by the better eye or that eye which receives the image closest to the macula.

Upon further investigation with any type of artificial changes in the accustomed squinting position it was noted that an annoying diplopia would most always result. In operative procedures, in cases of anomalous projection, where the visual axii are brought to parallelism, both eyes receive macular or very closely macular imagery, yet because of existing anomalous projection, the patient will see double. The string experiment in this case was tried and the usual report of two strings instead of the hoped for unified string resulted. Artificial changes in squinting positions can be created with prisms, mirrors and lenses and the patient will also report a diplopia. In all these observations it was discovered that even the slightest alteration in the accustomed angle of squint created an annoying diplopia.

Anomalous projectors show a great dislike for single binocular vision or fusion when an object is placed at the crossing point of his visual axii. This is the primary problem at hand in teaching these cases to see correctly. Lustre and normal replacement (superimposition of unlike images) must be forced upon the patient to the point where it is properly appreciated and interpreted. Even upon eliciting normal replacement the patient will report a monocular diplopia. Because of the patient's accustomed angle of squint, his muscle sense tells him that there must be one image in the direction of his object-image axis of the squinting eye, regardless of any other physiological diplopia that may have been created. He will, in due time, lose the feeling or sense of monocular diplopia and pay more strict attention to the two important clear images.

Before a patient is accepted for treatment, we must necessarily go through a complete refractive, fundi and neuromuscular analysis. This

is usually done in three visits. In cases where the visual acuity is low, it is important to determine whether any central scotomas exist. A fast and accurate test may be made with the Brock Scotoma and Projection Box (Fig. 7). If central scotomas do exist we know that our case will be difficult in as much as all our success will depend upon our ability to stimulate the peri-macular areas for peri-macular fusion and stereopsis.



The Bielschowsky after image test is made in order to determine the presence of anomalous projection. Here again we find that some cases will not manifest any uncrossed images, yet will show every other indication of anomalous projection. In many cases the after image showed uncrossed images at 3 to 6 feet with crossed imagery at 15 to 20 feet and visa versa. A thorough examination of the ocular muscles should reveal any paralysis, paresis and nystagmoid movements. Nystagmoid cases are still outside the realm of correction. Upon completing the analysis the patient is given an idea as to the best method of correction and the expected results. There is always the possibility that after the patient's projection is corrected that an operation is indicated where paretic muscles hinder the patient's muscular ability to pull the eyes out or in as the case may be.

It is important to demonstrate our mode of vision to the patient. For example, the string experiment tells the patient that if we, as normal projectors, hold a string from the wall to the tip of the nose, we will see two strings, no matter at which point of the string we may look. The patient may then use the string and find but a single one. The patient may be told that when he first started squinting his turned eye had the sensation of looking through an invisible mirror. A mirror is placed in his hand with an object such as a pencil in front of it. The patient is told to fixate the real object and at the same time to be conscious of the image in the mirror. He must point to the mirror image while fixating the pencil and is told that it is our job to eventually re-

move that mirror with the expectation that the secondary image will appear in the proper place according to his angle of squint or line of fixation of the squinting eye. A red filter is then placed over the one eye and a green one over the other. Close one eye and ask the patient to fixate a distant light. Uncover the other eye and ask the patient if he sees the secondary mirror image at the expected position with respect to the fixated image. The patient may find it difficult at first to locate the secondary image but it will appear soon enough. After fixation training with either eye, while being conscious of the other image, the filters may then be removed and the patient will report a diplopia. This diplopia will increase in stability as training goes on.

The first step taken in trying to awaken the dormant fusion mechanism is the development of lustre. With one eye fixating a black dot on a uniformly grey background, a transilluminator is placed over the closed lid of the other eye in order to send a red field of light to the retina of that eye. The combination should give the patient the impression of the black dot lying in a greyish red field. Some patients will be stubborn, but perseverance will give the required results in most cases. Inability to create lustre of this type does not present much hope for the correction of the squint. Use of the new BU Brock Keystone Series may aid considerably in the development of lustre.

Having established lustre our next job is to develop normal replacement. Normal replacement is the superimposition of two dissimilar images of two dissimilar objects, one to each eye, falling on corresponding retina areas. The patient is asked to fixate a point of light or some larger distant object while a narrow band of light is placed at the center and but a few millimeters away from the pupil of the other eye. After such persistant stimulation, the patient will report the distant object showing through .the band of light. As a normal projector you may experiment with yourself in the following manner. Fixate, for example, an electric switch on the wall. Then slowly bring either hand in front of the corresponding eye while fixating the switch with the other eye, and you will notice the switch showing through your hand as if the hand were merely a veil or something transparent. In our office, we have been using a boy scout flashlight with a bulls-eye drawing over the face of it. The patient is asked to place the distant point light into the center of the bulls-eye. If the angle of squint is considerable it is necessary to use a mirror in order to avoid moving the near target (bulls-eye) in

front of the fixating eye in cases of convergent squint. In some very stubborn cases we have been using the Brock Projection Box as a near target and the bulls-eye for distance. Once the patient gets the idea of what is expected he will respond accordingly. It is also advisable to give home training with a mirror. Let the patient work with larger targets at first, such as pictures on the wall, then to smaller objects. The patient will invariably report a tendency for the images to jump one another. This tendency must be broken down if exact macular fusion is to be attained. In normal projection training it is considered satisfactory if the patient can draw the near target at least to arm's length away from the squinting eye and still maintain the distant target within, without any "jumping." Once normal replacement has been well established, proceed to elicit peripheral stereopsis. This is done with the aid of red and green filters. Fusion targets or unification cards can also be hand made. Care must be taken that the red and green paper should be of that hue, which when viewed through the complimentary filter, (Redpaper-Green filter) the resultant impression should be black. The paper targets can be pasted on a large black cardboard or wall. Construct two rings, one green, the other red, both six inches in diameter and one-quarter inch wide. Paste them on the black background as concentric circles whose centers are one-quarter inch apart, laterally. In the exact center of these overlapping colored rings paste two half solid circles of two inches in diameter. The upper half is green and the lower red or vice versa. See Fig. 6. Draw

Fig. 6

some connecting design in the central circle. Place the red filter over one eye and the green over the other. An individual with any sort of fusion and normal replacement will fuse the outer rings into a single ring of

mixed color with the additional sensation of stereopsis. A squinter may require the aid of prisms or lenses to aid the fusion process. Movement towards or away from the target may cause a break in the two halved circles. With training, the patient will learn to hold the two halved circles in line as far away as twenty feet unless there is considerable paresis in the ocular muscles. The purpose of this type of training is to develop peripheral fusion and stereopsis with macular fixation. Of course, smaller targets of a similar type should be constructed so as to develop near macular stereopsis once the larger targets are mastered. It is important to have the proper type of filters and complimentary papers, otherwise four rings instead of one will be seen through the filters. Should the patient show a lack of appreciation for this type of fusion and stereopsis, you may be sure that he is suppressing considerably. It is most important that the patient develop a good sense of diplopia. This may be done again with the aid of the red-green filters. The technique of developing the consciousness of that second image can easily be learned by the operator with added experience. The patient may also be given some piece of colored cellophane or even a glass filter for home training of diplopia.

Another method of developing the range of fusion and stereopsis would be to construct another fusion colored ring chart but with an all white full center circle. To the center part of this circle attach a white string. Place the red-green filters over the patient's eye and the string stretched out to his nose. If the patient has the red filter over the right eye he should then get the impression of a V with the red string running to his left ear and the green to his right ear. This, by the way, is also a test for normal projection. If the responses are not correct do not hesitate to return to fundamentals including projection training. If the responses are as expected ask the patient to move as far out as possible with string on nose, fixation at the point of attachment of the string, stereopsis, and fusion of the central target of mixed color. Advise the patient to blink if the central target doubles. Above all, do not ask the patient to stare hard or use great effort to maintain single binocular vision. Some patients have a tendency to use their old anomalous muscular sense of visual direction and thereby suppress or increase their angle of deviation in making a determined try for single binocularity.

Once the patient has developed stereopsis, macular fusion with the string method, at 10 to 20 feet, with the consciousness of two differ-

ently colored strings in V formation, that patient is ready for the usual type of orthoptic training for the development of fine macular stereopsis and ductions. It is also advisable to give the string training without the use of filters. Remember, that it is always wise to go back to projection training occasionally in order to be sure that our foundations have not fallen or disappeared. Some patients are clever enough to know the answers required in regular orthoptic procedures, either from past experience with other doctors or from your own teachings. They may guess at the right answers even though their visual impressions are contrary to the rules.

Among the suggested orthoptic instruments for final training are the Brock Arrow-disc trainer, Rotoscope, Stereo-orthopter and the Keystone Tel-Eye Trainer with the new Brock BU Series.

It was the express desire of the writer to bring the Brock method for correction of anomalous projection to the conscientious eye practitioner, not as a substitute method for the correction of squint, but as the correct, tried and scientific way of handling such cases.

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AN OPTOMETRIC ARMY CORPS

In July the writer[1] discussed the plight of many optometrists now serving in the U. S. Army. It was pointed out that these technically trained men were called upon to perform specialized duties but were not accorded the military rank which should accompany the health work they were called upon to do.

In that editorial, a quotation from a letter received from an optometrist in the service was presented. This letter was but one of many similar letters received during the past year. All of these indicated that

[1]Carel C. Koch. Action Now Required on Army Discrimination Against Optometrists. Editorial. Amer. Jour. Optom. & Arch. of Amer. Acad. Optom. Vol. 20, No. 7, pp. 251-255. 1943.

something should be done by organized optometry to assist these optometrists who were serving their country.

As the result of those comments, the writer has received a number of additional letters from men in service. Optometrists doing army refracting in camps in this country and abroad. In every instance they again ask our help. Quotations from three of these letters follow. In each case the author will remain anonymous as these men are serving military masters who do not take kindly to frankly offered criticism. These letters are submitted to our readers to further illustrate the point already presented, i. e., that optometrists serving in the U. S. Army should do so as Commissioned Officers.

"The optometrists at this base were very glad to see that you are steamed up about the Army situation as expressed in your article in the July issue of the Journal.

"In the year that I have been here, I have worked under about six eye physicians, some of whom have been competent, others not; all were smugly superior and very condescending. Generally their attitude is 'he's an optometrist, but he can do a good manifest if he uses a cyclopegic.'

"Generally, they have no interest or understanding of near-point problems, and if they can't find at least 1.00 diopter of plus under drugs in a young patient, they dismiss him as a 'gold brick.'

"There is one important point, aside from our personal feelings that probably has not been brought to your attention. It is the fact that many of our patients, seeing that we are enlisted men, assume that we learned our work while in the Army, and have no confidence in our work. I know this to be a fact for the reason that many of them ask me this question; further, I have been told by some of the optometrists in the nearby city that many of their Army patients told them that they did not want to be examined by some enlisted man.

"You may be sure that only vigorous, direct action will ever achieve any results in this matter."

The points raised by this optometric S/Sgt. are well made and it is of some importance to us all to find that there is a general lack of confidence in our training when we serve as enlisted men.

The following are excerpts from the second letter:

"For quite some period of time, I have desired to write to you regarding a most important and foremost subject pertaining to our

profession—that of recognition in the army of the United States. Because of our mutual contacts in civilian life, I have learned to respect your opinions highly.

"Being a member of the United States Army, serving as an optometrist or refractionist, an individual like myself has plenty of opportunity to observe what is going on in the field of Army eyecare, and weigh seriously the effect on the present and future status of the professional optometrist.

Frankly, Dr. Koch, prior to the recent issue of the AMERICAN JOURNAL OF OPTOMETRY, I was extremely upset and disappointed in the apparent disregard or lack of editorial comment on a situation which affects and will affect optometry tremendously, both in and out of the service. I was surprised that a subject as important and far-reaching should be neglected in a journal which reflects the opinion of all the liberal minds in the profession. If the Journals—which are the pioneers of optometric advancement and thinking do not intelligently and fearlessly take up the torch and warn the average optometrist of the dangers of obvious 'isolationist' disregard of present conditions, then who can we turn to? Where will be the voice through which we must present our problems and emit our cry of warning? It was for this reason, and perhaps others, that many of us were beginning to lose hope in the future; and perhaps the cry of 'what's the use' is beginning to infiltrate the ranks of those in the armed forces. Let us trust this attitude will not become rampant among the ranks of those who have waited patiently—heeding the implorations of leaders who said and say 'be patient—all good things come to those who wait.'

"I commend your editorial, Dr. Koch, even though I must say that it is late. Yes, late, but strong. It is evident that the American Optometric Association, through our present leadership has gone slow —too slow—they have cautioned us with caution and more caution . . . 'do not disturb the sleeping lion, he may bite.' But the time has now come when we must be the lion; the American Optometrists, through our leaders, must now DEMAND the right of our men to be recognized, not only for personal benefit, but for the privilege and opportunity of her constituents to do all they can in the war effort, especially since the need for optometrists has been justly and ably proved.

"With the evidence that the American Optometric Association has been amassing it is unbelievable that our leaders would not recognize the

stifling of their efforts by the very stone wall which they claim has been out in front of them; they must change their method of attack. A stone wall, no matter how strong, can not withstand the ravages of truth and justice which we have on our side. Is it not amazing that with the tremendous need of refractionists in the army with use of hundreds of optometrists here and abroad, that the A. O. A. has not DEMANDED (even through Congress) equal privileges as the dental, physio-therapists, and pharmaceutical fields? Haven't we grown up to realize that anything worth getting is worth fighting for—not just waiting for? It is a proven fact that any advancement made by any profession, business or union, be it medicine, industry or labor, has only gotten such by tremendous effort. Nothing worth while is ever gotten by mollycoddling such as the A. O. A. is doing, for worthwhile objectives always have opposing forces, be it mental or physical—present in the individual himself in the form of conscience or in the form of a group who sees danger in another group's advancement. This fight is and can obviously be proven a political and economic fight, for our work and ability to render a great service is obvious. Thus a great fault must lie in leadership. As you so ably stated in your editorial—older optometrists remember the problems that they had to surmount, and did so unerringly and with a determination to win. We must have that same leadership today in a fight which in my opinion may well help to determine the future existence of our profession; especially when the question of socialization of health services is to come. We must be able to point with pride that we have done and can do our share.

"Yes, a tremendous amount of the eye work, if not the majority of the refractions done in the army is done by optometrists; but are we getting the credit for it, and do the optometric leaders think that we ever will? Certainly not willingly by the opposition. No—our work that the service optometrists are doing will never be told, if our opposition has its way. Cannot our leaders see what they are dealing with? What results can the leaders of the A. O. A. show in optometric army recognition in their two years of molly-coddling with officials?

"They seriously announce that 'five grades of sergeancy are soon to be granted.' This is ridiculous! These grades of sergeancy have always been there, for anyone to have—optometrists, clerks, or latrine cleaners. Any optometrist could invariably have received a higher rating if he had been placed in a clerical position rather than in eye work. Intelligent

men with only a high school education are soon taught the basic rudiments of military correspondence and office work, and are elevated to high non-commissioned ratings quickly; while optometrists doing a great deal of refraction work receive ratings which in many cases are far below those received by the men mentioned! It is my opinion that it is a mistake to even 'announce' the so-called 'five sergeancys' to the civilian optometrists and laymen. On the contrary, news like this should be kept as quiet as possible, for that is not a sign of recognition—it is a sign of weakness, of both the men and the profession itself.

"The question arises frequently when we are examining patients as to whether 'the army has trained us as technicians!' Are we hurting Optometry when we say 'no,' or are we hurting Optometry when we say 'yes.' On the one hand we hurt ourselves (Optometry) by seeming to admit that we deserve nothing better than non-commissioned ratings; on the other hand, we save Optometry's face by not admitting that we are optometrists. We here, invariably, tell all that we are optometrists, but we sometimes are undecided as to whether it is a wise course or not. We may be good 'public relations men' when we convince the medical men who we work with that we know eye work, but we certainly are 'poor public relations men' when thousands of soldiers (future civilians and potential optometric patients) learn that we are optometrists and not rated even in the higher non-commissioned officers grades! Which is the better way? We leave that to you and members of the American Optometric Association, which I believe, is not fully cognizant of the injury being done through lack of recognition; otherwise they would have made positive action long ago. With a little bit of experience in this situation, I am sure you would be, as I am, extremely worried about all this on postwar optometry. Thousands upon thousands of enlisted men and officers are seeing the picture daily in army hospitals. A mop in one hand and a retinoscope or ophthalmoscope in the other is indeed a very poor combination for respect and confidence.

"The work that we optometrists do at this camp is tremendous. All refractions, field tests, muscle tests, and a great deal of ophthalmoscopic examinations are done only by optometrists. The seven of us here do over 2,500 examinations per month! We have one or two ophthalmologists here, but they are too busy with any pathological work to assist us. (In fact, they themselves have cried for more ophthalmolo-

gists, but have been unable to receive same.) All examinations are done, as is required by the medical officers, with homatropine. The ratings we have are from Private 1 cl. to a staff sergeant, and this being three grades below the highest that an enlisted man can rise! I might add that the eye clinic is the busiest place in the hospital. It also might be sad or comical to add that at the end of the day a mop takes the place of the retinoscope so that the clinic will be ready for each morning's inspection. We examine practically all the medical officers in the hospital and the whole personnel of the camp, from privates to colonels. This is the situation as it exists here, and through correspondence with other optometrists, I know it exists at other camps.

"With a slogan of 'Let's Get Tough,' I remain"

Here again the plea is made to start action at once. Here an optometrist speaks; an optometrist who has given up his practice to serve with the armed forces and one who calls upon us all to not only serve him but to also serve optometry in getting for all optometrists the recognition now due them by the army.

Now let us turn to the comments of a third optometrist who is doing refractive work with the U. S. Army overseas. A practitioner who has given this subject a good deal of thought and whose opinions are of interest to the entire profession.

"In spite of the fact that the army, prior to the fall of 1942, was composed largely of the visually select, 15 to 20% of the troops applied for refraction and spectacles. Now with the abolishment of the 1B, there is injected into the army a tremendous new group of visual cripples and the number of spectacle wearing soldiers has skyrocketed. Couple with these facts, the knowledge that the army is providing almost every one of these men with two pairs of glasses and you are overwhelmed with the magnitude of this vital job.

"In an army of 5,000,000 to 6,000,000, we will probably have close to 1,000,000 soldiers wearing glasses. Just think of the trained personnel necessary to handle such a tremendous job. Since almost every soldier is furnished with two pairs, 1,000,000 men must be furnished with 2,000,000 pairs of spectacles *as their initial provision*. The loss and breakage is tremendous; experience indicates that these same soldiers will have to be provided with at least 2 to 2½ more pairs in replacement. Conservatively, therefore, we may estimate that the army by the end of 1943, shall have provided from 4 to 5 million pairs of spectacles.

"It is an army regulation that all spectacle wearing soldiers shall have the prescription of the lenses and frame specifications, both for their commercial and for their gas mask type, entered upon their service records. Therefore, all soldiers are processed through the eye clinics to see that his specifications are complete. Although the troops are notified to obtain their Rx, approximately 85% who present themselves do not have it because: the doctor is in the service and records are not available, the doctor is dead, or the soldier did not remember name of doctor. About 10% do not try to get their Rx. Figuring for 1,000,000, the result is that the army must determine the Rx by neutralization with trial case lenses, supplemented by the lens measure, of approximately 800,000 pairs of lenses. At our clinic, we have constructed a battery of targets like the target of the centering machine, for the determination of the axis and keep them busy constantly. It should therefore be obvious to the reader, be he optometrist, oculist, or optician, that he would be rendering a great service if he would furnish a copy of the spectacle Rx to every one of his patients who enters the service.

"The eye neglect which is revealed in the army is almost unbelievable. Thousands have presented themselves with spectacles, the Rx for which has not been checked in 5 to 10 years, yes and even 15 years. Multitudes of soldiers present themselves who have never worn spectacles, who have not been able to read for many years due to high errors of refraction. Thousands who need a new lens Rx intentionally wait until they come into the army to obtain refraction and spectacles without charge.

"Reading, which a great many soldiers must do to fill their leisure hours, and which for hygienic and morale reasons they are encouraged to do, has uncovered many latent visual errors and produced a tremendous stream of patients to the eye clinic. The breakage and loss of spectacles is very great, particularly when an organization goes on a field problem involving night action. Until a few months ago, soldiers, in the main, have been 'visually select.' The visual 'cripples' released into the army by the abolishment of 1B is increasing the demand many fold.

"As was stated, practically every soldier is provided with two pairs of spectacles, but they are of *different types*, commercial and gas mask. Therefore, two sets of specifications must be set up for each soldier, increasing the work greatly. Then, too, it must be realized that every one of these pairs of spectacles must be carefully adjusted. The gas mask

spectacle is very time consuming, inasmuch as it must be custom-fitted to prevent leakage, soldiers with unusual face and head shape may take 10 to 15 minutes to adjust. Another great hardship encountered at the eye clinic, is that produced by organizations going on the alert who need to be surveyed for spectacles; considerable personnel and facilities are necessary to care for large groups of soldiers in the short time available.

"Unfortunately, the demands for refraction and spectacles in the army increased so rapidly that the supply of these services fell way behind the demand. Surveys of troops to determine the extent and type of eye care needed were not made. Most of the soldiers who reported to the eye clinics did so because they had broken their spectacles, failed the drivers eye examination or their spectacles were no longer adequate. Many men who *should have* come in, because it was left to their own initiative, *did not come in.*

"Because of insufficient personnel in the eye clinics, appointments had to be delayed a considerable period of time and as a result, these men, when transferred have had to go to the station hospital in the next camp and request an appointment. Too often they were given the same explanation and an appointment for a month or two in the future. In this manner many men have been pushed along unrefracted for six months.

"Of course, the army pays a dear price for all of this. If a man is obtaining headaches or cannot see properly, he should be taken care of within a few days of the time he presents himself. If he is not refracted promptly and accurately, he soon becomes disgusted, his morale flounders, he frequents sick call and ingests a large number of aspirins, etc. He therefore becomes a much poorer and more inefficient soldier.

"Our experience with a typical infantry regiment, which was alerted a few months ago, and in which all spectacle wearing soldiers were seen, revealed approximately 350 men had lens prescriptions which were no longer adequate; men complained they could not see as well as they had been able to and/or their eyes hurt and caused headaches, etc. Since this regiment had embarkation orders and as a rule had rimless glasses (as by far the greatest percentage have when they come into the army) G. I. glasses had to be made to their old Rx even though it was no longer adequate. The government was therefore suffering considerable unnecessary expense inasmuch as these men will have to be examined eventually and new lenses furnished. Since soldiers are furnished two

pairs of spectacles, commercial and gas mask, the result is four lenses made instead of two and a great concomitant loss of efficiency induced.

"The above experience has been repeated in many organizations and it will be repeated with increasing frequency as more and more go on the alert unless adequate personnel and facilities are achieved.

"It is well known that refraction is a highly specialized and difficult science and even our finest physicians who have never refracted state that it is a job they would not attempt without first extensive study and training. It is well known, that the number of Eye Surgeons in the army is extremely limited and that they have more than they can do to answer the demands for treatment of eye pathology. They do not have the time to do even a small part of the refraction which must be done.

"As for training men to do refractions in the army, it is highly inadvisable if not impossible. The army cannot afford to entrust a man with refraction and its related jobs unless he has had basic college training preparing him for this work and actual practice on a considerable number of patients, therefore, the army has never opened a school to teach soldiers how to refract.

"The optometrist is of tremendous help in this problem; they are the only ones, excepting the few available oculists, who can answer this great and urgent demand for trained, competent refractionists. The army has recognized optometry, for although they are not assigned job classification numbers at induction or given a definite rating or commission, a great number of them are working in eye clinics in many camps. In fact, if a survey were made of all army eye clinics to determine who it is that is doing a large part of the refractions, it would be found that it is the optometrist. Optometry can therefore be very proud of the fact that its men are answering a very vital need and making a fine contribution toward the winning of this war.

"Within the last few months, eye surveys of troops are being made and it is fast becoming apparent that the demand for refraction and spectacle service is becoming so great that if every optometrist in and coming into the army were put to refracting immediately, they could hardly take care of the demand.

"Unfortunately, great numbers of fully qualified optometrists are in the service and not working as such. They have completed the requisite number of years of study at 'A' grade optometry colleges such as

Columbia, Ohio and California Universities, and Penn. State and Northern Illinois College of Optometry. They have passed state boards and possess state licenses testifying to their right and adequacy to do refractions. The optometrist in civilian life does by far the greatest part of the refractions for the nation. The army as well is using the skills of these men to help it through its great need for personnel who can refract and can properly fit spectacles for its approximately 1,000,000 spectacle wearing soldiers. The optometrists have proved to the army how well they can do the job.

"Many camps like ours with three optometrists or more (some have 5 and even 8) have been able to answer the demand; many camps, however, have been unfortunate and have had the services of only one (or no) optometrist and only one eye surgeon. It is in these camps that the soldiers who badly needed refractions have gone without it and suffered as a result.

"Optometrists are (and could be used in much greater number with great benefit) working in induction stations. For a great number of selectees, who do not have the requisite visual acuity, it is necessary to determine with great speed, without 'eye drops' the extent to which his vision can be improved by lenses. This is done by retinoscopy. This work must be done with the greatest of accuracy since it is the results of this test which will decide his classification. The optometrist is well trained and experienced with the retinoscope and can and does aid very greatly in this work. For the army to attempt to train retinoscopists is very highly inadvisable, if not impossible. To be a fast and accurate retinoscopist requires considerable study and experience.

"The placement of opticians in the army eye clinic is poor personnel management. He is needed for his skill in the manufacturing of glasses; his place is more properly with the mobile optical units. The optometrist can serve both functions in the eye clinics, since he can both refract and dispense. And so I conclude,

"Although the optometrist is officially recognized in every other English speaking army of the United Nations (i. e. commissioned in the Australian Army, given technical sergeancies in Canada and some commissioned in the English Army and United States Navy) it is impossible to state what the future holds in this regard for the optometrist in the United States Army . . . "

These disgraceful refractive conditions alone call for correction. Ig-

nore if you please the slight being done to optometrists in the army. Ignore if you can the harm being caused optometry, but you cannot ignore or longer put off taking action on the improper manner in which the men in our armed forces are served by a Army Hospital unit that puts its own selfish aims above the real service it should be giving to the men it is there to serve.

The writer is by no means alone in his demands for action. Many practicing optometrists, too, have written asking him to again present this subject. A fellow Academy member, Dr. W. S. Farmer of Oklahoma City says:

"Permit me to compliment you upon your editorial in the July issue of the AMERICAN JOURNAL OF OPTOMETRY regarding army discrimination against optometrists. For several years now I have advocated this very thing, but even today there seems to be a lot of lethargy among our leaders as to this particular phase.

"The only thing we have found against the P. A. P. was that they had their objectives reversed; in our opinion, commissions for optometrists should have been first on the list.

"It might interest you to know that we passed the enclosed resolution before the Oklahoma Convention and then succeeded in getting the A. O. A. to adopt the resolution in Chicago; also the one pertaining to a legal file, but the adoption of a resolution is not sufficient. It must be followed up. More power to you."

The Resolution referred to calls for the introduction of legislation in Congress to create an optometric corps, and this is fine. But we must not stop with the passing of resolutions. This is a fight that will take more action than that. Resolutions are fine as a start, but real sincere action must follow. As these comments are being assembled, Congress is home on a short summer vacation. Here they will meet with civic and professional leaders. It is hoped that when they return to their duties in Washington on September 14 that certain members will have in their possession suitable bills which they can introduce to correct the injustice which is being done.

We must act collectively and we must act now. Only the most aggressive action, taken without further delay, can correct the problem and give to optometry what is rightfully hers. An Optometric Army Corps.

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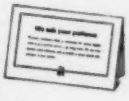

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